

## CLAIMS

We claim:

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1. An apparatus comprising:
    - a first optical fiber having a first end;
    - a first collimator having a first end and a second end, said first end of said first collimator connected to said first end of said first optical fiber;
    - a second optical fiber having a first end;
    - a second collimator having a first end and a second end, said first end of said second collimator connected to said first end of second optical fiber;
    - a prism connected to said second end of said first collimator and to said second end of said second collimator; and
    - a substrate securing said prism in optical alignment with said first collimator and said second collimator.
  2. The apparatus of claim 1 wherein said substrate is a precision v-groove chip.
  3. The apparatus of claim 1 wherein said substrate is formed from nickel using a LIGA process.
  4. The apparatus of claim 1 wherein said substrate is precision molded plastic.

5. The apparatus of claim 1 further comprising an index-matched material connecting said first collimator to said prism.

6. The apparatus of claim 5 wherein said index-matched material comprises an index-matched adhesive.

7. The apparatus of claim 1 wherein said prism is molded in place on said substrate from index-matched material.

8. A method for making a fiber optic U-turn device comprising a first collimator, a first optical fiber, a second collimator, a second optical fiber, a prism, and a substrate, comprising the steps of:

connecting said first collimator to said first optical fiber;

connecting said second collimator to said second optical fiber;

placing said first collimator onto said substrate;

placing said second collimator onto said substrate in a predetermined orientation relative to said first collimator;

placing said prism onto said substrate in a predetermined orientation relative to said first and second collimators;

connecting said first collimator to said prism; and

connecting said second collimator to said prism.

9. The method of claim 8 wherein the steps of connecting said first collimator to said prism and connecting said second collimator to said prism comprise using an index matched adhesive to bond said first and second collimators to said prism.

10. A method for making a fiber optic U-turn device, comprising the steps of:  
optically coupling a first collimator to a first optical fiber;  
optically coupling a second collimator to a second optical fiber;  
placing said first collimator onto a substrate;  
placing said second collimator onto said substrate in a predetermined orientation relative to said first collimator; and  
forming a prism on said substrate in optical association with said first collimator and said second collimator.

11. The method of claim 10 wherein said step of forming said prism comprises using an index-matched material to mold a prism onto said substrate in a predetermined orientation relative to said first and second collimators such that said first and second collimators become integrally connected to said prism.

12. A method for making a fiber optic U-turn device, comprising the steps of :  
connecting a first collimator to a first optical fiber;  
connecting a second collimator to a second optical fiber;  
connecting a first length of coreless optical fiber to said first collimator;

connecting a second length of coreless optical fiber to said second collimator; and  
forming said first and second lengths of coreless optical fiber into a prism.

13. The method of claim 12 further comprising the steps of placing said first and second collimators in side-by-side abutment;

filling the valleys formed by said step of placing with an adhesive having a refractive index matched to the refractive index of said first and second collimators.

14. A fiber optic U-turn device, comprising:

a first collimator;

a first optical fiber connected to said first collimator;

a second collimator;

a second optical fiber connected to said second collimator;

a prism connected to a free end of said first collimator and a free end of said second collimator, said prism being formed from at least one section of coreless optical fiber.

15. A fiber optic U-turn device, comprising:

a prism;

a first optical fiber connected to said prism;

a focusing lens connected to said prism;

an optical coupler connected to said focusing lens, said optical coupler having a first index of refraction;

a second optical fiber connected to said optical coupler, said second optical fiber comprising a cladding having a second index of refraction, said second index of refraction substantially matching said first index of refraction.

5 16. The apparatus of claim 15 wherein said optical coupler comprises an optical gel.

17. The apparatus of claim 15 wherein said optical coupler comprises a section of coreless optical fiber.

10 18. A method for making a fiber optic U-turn device, comprising the steps of :  
connecting a first collimator to a first optical fiber;  
connecting a second collimator to a second optical fiber;  
connecting a length of coreless optical fiber to said first and said second collimators; and  
forming said length of coreless optical fiber into a prism.